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ABSTRACT

Even though we live in an age of advancing technology and changing structure of science, especially in genetics engineering, there appears to be a great lack of understanding of these basic concepts by society in general. Society carries responsibilities to both living and non-living things; this lack of understanding may result in combined economical and environmental costs for everyone. Genetic modifications can produce enormous consequences. In North America, the focus of environmental education is on the issue of human sustainability, which follows a technocratic approach with the support of government. This paper points out the few published studies that provide insight into the nature of student understanding of human-animal relationships and investigates eighth grade students' perceptions of today's most pressing environmental concerns. (Contains 22 references.) (YDS)

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Children's Preconceptions of Human-Animal Relationships, Dispositions Towards a Humane Consciousness and Implications for Curriculum and Instruction

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Introduction

When I opened the newspaper on the morning of Friday, January 14, 2000, I found myself gazing at the face of a small four-month old macaque named Tetra. The bi-line read "First cloned primate born" (Honey, 2000). Below was a pictorial representation of two methods of cloning currently employed in scientific research; embryo splitting and nuclear-transfer technology. It was a particularly serendipitous moment as my students and I were in the midst of investigating the grade 9 unit on reproduction and the textbook had given few practical examples from which to begin a critical discussion. As I read through phrases such as, "*breakthrough* hailed as medical boon", "benefit in understanding a range of *human* disorders" and "*removing* and *cutting* fertilized eggs", I kept naively wishing there to be even a modicum of ethical concern for the welfare of the monkey, but I quickly realized that the intent of the article was not to be critical of the event, rather, it was another instance of the reification and/or blind acceptance of scientific and technological research.

This is not the only example illustrating the way in which animals of non-human form have been manipulated and engineered for the purpose of serving human ends. As we look back at the so-called scientific accomplishments of the last two decades in genetic engineering, there is a telling list of animal experimentees:

1980 First genetically modified mouse
1986 First transgenic sheep born carrying a human clotting-factor gene
1990 First transgenic pig born carrying DNA for human anti-clotting protein
1990 First transgenic bull carrying extra gene for human lactoferrin
1991 First transgenic dairy cows produced carrying a human gene for lactoferrin
1997 Dolly the sheep born, first mammal cloned from adult cells
1999 Cloned goats carrying spider-silk proteins in milk to be recovered for the purpose of creating human tendons and ligaments
2000 First cloned monkey, Tetra, to be used for investigating human disease
2001 First genetically modified non-human primate, a transgenic rhesus monkey named ANDi to be used for the testing of vaccines for Parkinson's and HIV

We are, as a society, entering an era of enormous ethical complexity. Our scientific and technological knowledge has reached a state of unprecedented proliferation and sophistication. It is a time when our understanding and concern about scientific concepts and technological advances must be informed and robust in order to hold the scientific community to ethical standards of practice. However, several recent studies conducted on public perception of genetic engineering processes have indicated a great lack of understanding of the basic concepts (Gunter, Kinderlerer & Beyleveld, 1998; Zimmerman, Kendall, Stone & Hoban, 1994), and extreme ambivalence of opinions (Gaskell & Durant, 1997).

This is not a situation to be taken lightly. As a society, we have responsibilities towards the subsequent generations of both human and non-human species. Thus, there is a sense of urgency for people to take notice and become concerned with issues that will have an impact on our current and future well-being. There is a cadre of scientific events to draw from in the past that should incite us to action. We could not forecast, for example, the deleterious effects that carbon dioxide emissions would have on our environment when the combustion of fossil fuels was first introduced as an energy resource. We unwittingly pressed forward in our scientific advancements, seeking bigger and better cars, newer and more powerful generating stations and the list goes on. Our lack of foresight and prudence is now costing us an enormous amount both economically and environmentally. In the case of the genetic modification of living beings, the outcomes may be more insidious than the global warming issue for we are now dealing with altering the essence of life and traveling down an irreversible path. Genetics has allowed us to now insert human genes into the reproductive cells of pigs in order to create a higher probability that human transplant recipients will immunologically accept pig organs. In addition to the highly charged moral implications this possibility will render, we have no way of predicting what the long-term consequences will be on the genetic variation of pig species and on humans. There's no way scientists can test all possible combinations and outcomes over a large enough population, over a long enough period of time to be able to say with certainty that these kinds of experiments are harmless. However, we do not seem to be taking seriously, the lessons to be learned from the history of science. In assessing the damage to our weather systems, to the ozone layer, to the barren acidic lakes, to the once luscious rainforests, to the diversity of living organisms, we should be looking forwards with a much clearer vision.

Our societal ambivalence and lack of understanding towards genetic engineering issues is evidence of a failure on the part of those who must educate towards a greater awareness about emerging scientific knowledge. What I am talking about is the responsibility that schools and teachers have for fostering a critical view of science and technology that includes moral and ethical considerations of all living beings. Hart, Jickling and Kool (1999) ask the question, "What does good education look like?" referring to environmental programs in schools. While I shall enter into a commentary about this question later on in the paper, at this point, I'd like to suggest that the answer *cannot* be found in standard environmental or science education curricula as they are implemented in today's classrooms.

Environmental education, currently practiced throughout North America, is geared towards issues of human sustainability. Primary importance is placed on the responsible utilization of natural resources, management of pollution, and the economic impacts of technology. This form of environmentalism has been characterized as a technocratic approach (Bell, Russell, & Plotkin, 1998) and is strongly supported by government mandated curriculum documents. For example, six of the seven expectations relating science and technology to the outside world in the grade 7 ecology unit of the of *The Ontario Curriculum, Grades 1-8: Science and Technology* (1998), are concerned directly with improving the environment for societal purposes. These are:

- investigate the impact of the use of technology on the environment (e.g., the "greenhouse effect"; redirection of water flow for human needs; use of pesticides)

- investigate the bio-economical costs and benefits of the recycling and waste-disposal industries
- explain the importance of plants as sources of energy (e.g., food, fossil fuels), as producers of carbohydrates and oxygen (e.g., phytoplankton), and as habitats for wildlife
- describe the conditions in an ecosystem that are essential to the growth and reproduction of plants and micro-organisms, and show the connection between these conditions and various aspects of the food supply for humans
- identify the importance of plants in the Canadian economy (e.g., in farming, forestry, drug manufacturing, the nursery industry) and describe the impact of the industrial use of plants on the environment
- identify and explain economic, environmental and social factors that should be considered in the management and preservation of habitats (e.g., the need for recycling; the need for people to have employment).

The concern for non-human life forms factors into only one of the specific expectations:

- explain the long-term effects of the loss of natural habitats and the extinction of species (e.g., loss of diversity of genetic material, both plant and animal)

The message from this document is quite unambiguously promoting environmental education for the purpose of human sustainability. This view is instantiated in a "shallow" approach to environmentalism first coined by Arne Naess in 1973, in a paper entitled, *The Shallow and the Deep: Long Range Ecology Movements* (Corcoran & Sievers, 1994; Devall & Sessions, 1985; Capra, 1996). Central to the shallow ecological paradigm is the belief that human life is superior to all other life forms. The value afforded to non-human species is only measured against human objectives i.e., they have little or no intrinsic value. As Plumwood (1996) eloquently states, "in the absence of care and respect for what is studied and of responsibility to those who will be affected by it, it is inevitable that the knowledge relation is constructed as one which the known is merely a means to the knower's ends or to the ends of power which they will come to serve" (p. 78). Such anthropocentric thinking is suggested to be the root cause of the global environmental crisis (Corcoran & Sievers, 1994, Russell & Bell, 1996). Through objectifying nature, humans absolve themselves of any moral responsibility for the care and preservation of the natural environment. In education, teaching methodologies and school curricula have been strongly criticized for perpetuating this understanding through its emphasis on technical efficiency over conscience (Orr, 1994), theories over experience and logic over emotions. Russell and Bell (1996) write, "in schools...anthropocentrism is manifest in the fact that the non-human rarely figures except as a backdrop to human affairs (or worse, as an object for dissection or other experiments)" (p.173).

There is, however, an alternate more holistic route available; one that opts for a biocentric rather than an anthropocentric world view and one that holds far greater potential for moving societal opinion beyond ambivalence. In contrast to shallow ecology, *deep ecology* advocates the notion that all things in the biosphere have an equal right to exist on this earth, possess their own intrinsic value and are fundamentally and inextricably interconnected. Nature is perceived as more than just a resource for human use (Russell, 1997). There is a genuine and

deep respect for all forms of life and recognition that through a myriad of channels, we are connected in a complex web of associations within a unified whole.

Teaching from a deep ecological perspective would mean placing less emphasis on strictly content-oriented curriculum and more on attaining a critical understanding of the underlying causes of environmental issues. Acknowledging that all life-forms are essentially equal and studying the harmful effects of human activities, requires a critical examination of the values promoted in society and institutions that are in control of decision-making processes. Critical thinking skills of negotiation, collaboration, debate and communication, need to be developed in order to evaluate these systems. A focus on values would also necessitate addressing the affective components of learning, as the study of values tends to evoke strong emotional responses. Thus, the promotion of compassion, caring and empathy, notions of justice and equality, and placing importance on experiential learning are desirable aims within a deep ecology paradigm.

For a decade and a half, humane researchers have been applying these core tenets in efforts to transform environmental education. Finch (1988) writes:

> We need to remind environmental educators, who are often predisposed to the humane ethic, that without humane education, environmental education reaches the mountains,
> but not the trapped coyote; the oceans, but not the aquarium-bound whale; the Arctic, but not the clubbed seal; the cities, but not the stray dog; the open ranges but not the cinched rodeo horse; the farmlands, but not the crated veal calf; the endangered species, but not the abused animals. (cited in Selby, 1994, p.13)

In light of the current genetic engineering agenda of the scientific community, and those of other economically interested groups such as pharmaceutical companies and agriculturists, it is imperative that ethical considerations for the care and preservation of non-human species enter into classroom discourse. Discussions of this sort would have a dual purpose. The first being that the needs and rights of non-human members of our society compared to the needs and rights of human members are seriously addressed prior to the development of new experimental procedures and technologies. This would at least open the door for critical evaluation of the purposes and eventual outcomes of such developments with an aim towards minimizing or removing the potential negative effects. The second purpose is important in facilitating a more general environmental awareness. Selby (1994) writes, "[T]here is mounting evidence that school students feel very strongly about animal cruelty and abuse. On the basis of "starting where the shoe hurts," an exploration of animal welfare and rights issues may be the entry point to a wider environmental consciousness for many young people" (p.14).

Although the claim has been made of "mounting evidence", to date there have been relatively few published studies that provide insight into the nature of student understanding of human-animal relationships. One research team has shown that children aged 13/14 do indeed hold definite beliefs about the acceptability of different uses of animals by humans. Foster, Stanisstreet and Boyes (1994) found that nearly three quarters of the pupils they surveyed felt that doing experiments on live animals for teaching purposes was unacceptable on the

grounds that it was cruel and immoral. A quarter of them felt that doing dissections on animals was unacceptable for the same reasons, while 36 percent felt that it was conditionally acceptable if the animal had died naturally. Comparatively fewer children had objections to animal experimentation for medical research (48% unacceptable vs. 30% acceptable), while almost all of the respondents (94%) felt that testing for cosmetic purposes was unacceptable for reasons ranging from cruel to unnecessary. Although much valuable information has been provided here, little is understood of how decisions about unacceptability and acceptability have been made as a result of an understanding of the relationship and connections between humans and animals. Hart et al (1999) write, "Complexity is a key feature of the natural environment. However, humans also create very complex political, economic, and social systems. Environmental education needs to involve the analysis of complex systems. Understanding the links between the complex natural and human systems is of utmost importance" (p. 109). If environmental educators are to begin programming for a biocentric curriculum then it is necessary that they explore student understanding in greater depth. The following study was constructed to help educators begin this exploration. The principal questions guiding the study framework are:

1) What are children's preexisting conceptions about human relationships with animals?
2) Prior to any teaching interventions, what level of a humane consciousness do students already possess?
3) Based on the students' present understanding, what are the possible directions that school curricula could take to encourage the adoption of a deep ecological, biocentric world view?

Participants, Methodology and Data Sources

The participants in this small case study were eight grade 5/6 students who attended an extra-curricular Saturday program designed to enhance learning in the subjects of mathematics, language and science. Classes were held every Saturday for three hours in the afternoon. There were five boys and three girls in the group, each with varying levels of cognitive ability. All were from a middle class background. They attended different public schools across the greater metropolitan region of Toronto during the regular week. I was the teacher of this class and originally conceived of the study as an action research project to inform my own teaching.

In total, three two-hour sessions were designated for activities undertaken in this study. In order to elucidate what students felt to be the most pressing environmental concerns of today, session one required the students to first individually reflect on, jot down ideas and produce a drawing of what they believed the world would be like in 50 years. Secondly, students discussed their opinions in small groups and then were asked to share the content of their discussions in a larger group discussion format. Data sources included student notes, pictures and teacher field notes of small and large group discussions.

In session two, students were asked to write down their thoughts on the following question: Is it acceptable for humans to use animals in these ways? Explain your reasoning.

i. for human consumption
ii. to make fur coats
iii. for entertainment at the circus
iv. for medical testing
v. as pets
vi. as seeing-eye dogs for the blind
vii. for viewing at the zoo
viii. for make-up testing

This was an individual task. Students were not permitted to discuss their answer with anyone else. Using their answers as an anchor, they were then asked to fill in a survey that was designed specifically to address student understanding of the interdependence and interconnectedness between humans and animals and the intrinsic value afforded to them. The following questions were asked:

1. Do you believe it's okay for humans to use animals in any way? Explain your answer.
2. Do you believe animals differ from humans? If so in what ways do they differ?
3. Do you believe humans depend on animals in any way?
4. Do you believe animals depend on humans in any way?
5. Do you believe animals and humans are given equal status in our world? Explain why you believe this.
6. Do you believe humans and animals are equal? Explain.

The third session required the students to debate their answers. Two panels of four students were formed, one group being the discussants and the other group being the evaluators. The members of the discussant panel investigated ideas about the question at hand, while the evaluators were instructed to listen carefully to the discussion and write down any questions or comments they wanted to pose to the discussants after the formal part of the discussion was completed. A volunteer chairperson for each discussion was selected whose duties were to read the question being discussed and to ensure that everyone in the discussion group had a chance to speak. There were no restrictions placed on how long each person could speak or on how long each question could be discussed. Responses to questions # 1, 2 and 5 on the survey form were recorded on video tape in the time available for the session. A new combination of discussants and evaluators were formed for each question. All dialogue and responses recorded resulted from student-student interactions. A 45 minute video-recording of the debate was transcribed and used for qualitative analysis. After the debate, a second survey was administered in order to determine whether any conceptual changes occurred as a result of the discussions. Teacher field notes were also used in the analysis of session three.

Rationale for Selection of Activities and Methods of Evaluation

In session one, students were asked to provide their thoughts about a future world to elicit the most salient issues that they felt would continue to have an impact on the Earth in years to come. From their jot notes and drawings, it would be evident whether or not concerns about non-human species factored into their conception of important global issues. The impetus for

the question posed in session two was an activity in Selby (1996) entitled *Where do we draw the line?* which is geared towards secondary level students and has fairly advanced cognitive, language and organizational requirements. I felt a less advanced, modified version would suffice for these elementary students. Students were asked to complete the first survey in order to contextualize their understanding and to provide a baseline measure of where each child was positioned on humane issues. The information in the second survey administered was intended to provide insight into students' understanding of the social and processive functions of the discussions they engaged in.

A discussion format in session three was chosen for several reasons. First, a social constructivist learning approach to teaching and learning, which places primary importance on collaborative inquiry and the tool of discourse as the vehicle for learning (Woodruff & Meyer, 1997), has been shown to be extremely effective in socio-emotional and academic growth in the areas of concept attainment, self-actualization, motivation, perspective sharing and knowledge-building (Scardamalia & Bereiter, 1994; Yoon, 1999). Secondly, in an effort to promote the metacognitive value of the message being embedded in the medium and to foster democratic awareness, I removed myself as the central figure in order to encourage initiative-taking and decision-making by the students. The activity was also deliberately structured and referred to as a 'discussion' rather than a 'debate' in order to promote collaborative rather than competitive modes of discursive interaction. The division between discussant and evaluator groups was constructed to give students practice in listening and critical evaluation skills. Finally, as one of the goals of the study was to identify preexisting conceptions on humane issues, allowing students to discuss their ideas in an open format, in contrast with a tool like a questionnaire, would allow for greater insight into their understanding.

Results and Evaluation of Student Understanding

Session One

Three of the drawings representing what the world would be like 50 years into the future showed badly polluted cityscapes with sparse or dying flora. Notes that accompanied these drawings included the following:

> "Pollution and technology will kill all living creatures, including humans."
> "...if we don't plant more trees and keep on polluting and killing, our world will be a disaster."
> " [there will be] more war, less nature, a lot of buildings."

Two depicted space travel, with these quotations attached:

> "I think that the Earth would be so filled with pollution that we [will] have to find another planet to live on. It means that the Earth is no longer suitable to live on."
> "...Pluto is a place where you can ride a rocket and go to other galaxies. They share their world with Martians. Also there is less pollution in the free system."

One showed various situations of humans interacting with robots. This student wrote:

> "...humans had built robots to work for them. Because that happened people got more lazier and dumber...So, if the robots keep on building robots, the robots will become stronger when the human is getting dumber. Then the robots will become stronger...which will make humans work for robots not robots working for humans."

Of all of the participants, only one student created a drawing that showed positive or optimistic beliefs about the future. She wrote:

> "I believe that in 50 years, people will realize that they are destroying our world and will leave many parts of the world alone so it has time to regrow itself and be less polluted. People who live in these parts would own gardens, grow fruits and vegetables and would not hunt or kill animals unless for food."

In their small group discussions the students seemed to have a fairly good understanding of what the current environmental issues were. They collectively identified concepts such as loss of habitat due to deforestation, increased global warming, overpopulation, animal extinction concerns, shifts in climate patterns creating effects such as strong winds and violent thunderstorms, food chain disruptions, acid rain and pollution. When I probed them about where they heard or learned about this information, some had addressed the issues in their regular school, they made references to science programs on television and a few said that they were just well-known facts that people talk about everywhere. Although the students could not articulate the specific causes of environmental problems there was ample evidence that the dialogue had been initiated in their schools and that they sensed some urgency in seeking out solutions.

Apart from the brief reference to not hunting or killing animals for food in one of the student's notes, there was no other mention or pictorial representation of human influences on animals. In the small group discussions, it was apparent that students understood that deforestation was causing the loss of habitat and animal extinction, however, there was no discussion as to why deforestation was happening and further, no discussion of the possible consequences of a reduction of animal species such as loss of biodiversity and why this is important to consider in our world.

Sessions Two and Three

The data reported here are largely taken from the 45 minute video-recording of their discussion of questions 1, 2 and 5 on the first survey form. Some written responses taken from the second survey and a portion of the teacher field notes were also used in this analysis.

Selby (1996) identifies four broad learning goals, which the field of humane education embraces:

- a *Biophilic ethic* - having a respect for the intrinsic value of all livings things,

cultivating a sense of compassion and caring towards both human and non-human species, having a concern for maintaining the existence of biological and cultural diversity and challenging and rejecting all forms of discrimination

• *Interconnectedness* - acquiring an understanding of the relationships that exist between all natural and human made systems, emphasizing the notion that all human actions have consequences that will affect a global system including human and non-humans species, having an awareness of and acting on choices to maintain an ecologically sound and humane lifestyle

• *Values perspectives* - being open to and understanding the validity of all perspectives, recognizing that world views, assumptions and beliefs are determined by values and therefore, in order for any progress to occur, understanding that values must be openly examined and evaluated

• *Democratic principles and processes* - manifesting democratic values such as fairness, equity, justice and freedom and included within this vision of democracy, rights afforded to all living beings, acting on the notions of citizenship, accountability and responsibility in both a local and a global sense and actively participating to achieve a democratic society

The elements presented in each of the above learning goal categories were employed in the analysis of the data.

Evidence for a Biophilic Ethic Orientation

There were several instances in which students demonstrated a strong disposition towards an ethic of care and that they possessed an awareness of society's general mistreatment of animals. For example, when discussing the question of whether animals and humans are given equal status in the world, it was unanimous among the discussants that animals are mistreated in our society:

Caroline: I don't think that humans and animals are given equal status in our society because animals are being used for fur coats which we don't even need...they aren't necessary items, we use them for testing and sometimes they die but animals cannot use humans for anything.

Justin: I don't think so because humans are stronger than animals and therefore we do anything we want to do like destroy forests, which are the animal's homes.

Kevin: I agree, I think that they're not treated equally. We always treat them bad, some people have dogs which like tear up carpets and stuff and you see them hitting their dogs, which is not right, but you don't see [the dog] hitting them back.

Caroline: Kevin, you said about them not hitting us back, I think that's because once they get hit, they're afraid of humans and get scared.

Rachel: I agree with you guys because nobody is really caring about animals. They are just thinking "What can we do with these *things* in the future." They're thinking about new technology that could be used in the world and they use animals to test these new technologies to see what their reactions are. They use

eye shadow and lipstick and smear it on the animal's skin. They aren't given equal status because humans don't really care.

This stream of thinking continued when the discussion was opened up to the evaluators. Here the interchange demonstrated an appreciation of the intrinsic nature of animals:

> Ryan: [You were talking about] we hit them, they hit us, [but] what should we hit them for?
> Kevin: People hit them if they do bad things, animals are punished for the way they act, they can't help it...they can't...
> Ryan: Resist temptation?
> Kevin: Yah, they're just acting like themselves. It's like every boy likes chocolate right? And we can't resist eating it right? We'll it's the same thing for dogs [except] they get hit for being themselves.

Similarly, on the issue of respect for animals, many comments indicated a belief that animals deserved the same amount of respect as humans. When discussing whether humans had the right to use animals in any way, Rachel remarked, "I don't think that they should because animals have important lives. They are just as important as humans". The rest of the panel and likewise the evaluators signaled their agreement. Ryan continued in the discussion:

> My reason is that animals [are] supposed to have freedom like us and make-up testing and medical testing, well we can't even guarantee that they will live right through the testing. We [need to] guarantee 100% that they *will* live.

Caroline's response to this statement showed an understanding that the *quality* of life as well as the value of life needed to be considered:

> You said that you want to make 100% sure that the animals should live and I think that's really good but also people should make sure that they don't get hurt too. What if they have all these bruises and cuts in the end and they let them go?

Ryan pondered this point for a moment and then replied "Yah, 100% alive means not getting hurt."

Another interesting line of thought that developed in this discussion focused on the existence of zoos. Kevin suggested that the function of zoos was premised primarily on good intentions based on the reasoning that they protect endangered species. Some of the students challenged him on this perspective:

> Caroline: Somebody said that it's okay to keep [animals] in zoos and then let them go after a while, I think it was Kevin. But I kind of disagree because what if in the zoo they have a baby and then their baby is kept there for a long time and when they take them to the wild, they don't know what to do because their mother never taught them.
> Kevin: Some baby tigers are getting killed because of hunters.

Caroline: Yah, like poachers.

Kevin: [nodding] And that's why they keep them in zoos to keep them safe from poachers and safe from extinction. We don't want to train them to do tricks or anything.

Caroline: Some places keep them but don't let anyone else see them but some places. ..they take money from the people to come and watch the animals.

John: If you were the animal and you were kept in the zoo (usually they're kept alone one per room) wouldn't you feel sad if you couldn't see your mom and dad?

Kevin: You know like refugees, they've been forced out the country because it's too dangerous for them to stay right and they take them to a safe shelter until their country is safe enough to go back to? It's like that.

Ryan: But Kevin, they can die in zoos too.

Kevin: Okay, you think the tigers would like it if the poachers just came and killed them. And then our children would only be able to look at them in a book. Zoos are just trying to save their lives that's all.

Caroline: They do make money you know, they do make money.

The conversation returned to the topic of zoos at other times during the session demonstrating the saliency of this issue amongst these students.

Ryan: I want to make a point. Kevin, how would you feel if you were on a stage and you were an act for 24 hours, 7 days and week and four weeks a month.

John: And you get nothing for it.

Ryan: You only get food, you don't meet other animals. The polar bears in the cage don't get to see other animals that are supposed to be living in the same habitat like seals.

Steve: If animals are in zoos, it's like they're prisoners but they didn't do anything wrong.

Young Eun: I don't think that animals would be happy in zoos, it's not really their home and you can't really make the zoo look like their real home.

This lengthy text was included to show that nearly everyone had an opinion on this topic and whether arguing for or against the premise of zoos, their reasoning stemmed from the same respect for the inherent value of an animal's life.

Evidence for an Interconnectedness Orientation

Although a biophilic orientation seemed to be ubiquitous among the participants, there were fewer students who demonstrated an understanding of the elements that fall under the category of interconnectedness. Three students, Young Eun (a passive participant for most of the session), Rachel and Caroline *did* feel fairly strongly that humans and animals were connected by inherent similarities:

Young Eun: I'm not sure who said this but, they said that animals are really different because they live outside. But some [animals] like house mice, they still live in buildings and owls live in barns so not every animal lives outside.

Steve: And some humans [do] live outside.
Young Eun: Right and some humans live outside like the [Inuit].
Caroline: She's right because some birds make nests that go all the way around and they enter through small holes, ants and squirrels live in the hollows of the trees.
Rachel: I think it was Justin who said that animals have more fur and you were talking about physical things but what about how they feel? Can't they be the same like humans, like what about if something hit us in the head, we wouldn't feel too good. What would happen if an animal got hit in the head, do you think they'd feel happy?
Justin: No. [giggle]
John: Well it depends on if they could feel it.
Steve: But some animals can't feel it, like a rhinoceros.
Caroline: Some animals don't have a lot of nerves.
Young Eun: Come on, animals all have nerves.

Elsewhere, Caroline brought up the point that animals had specific talents and on the question of intelligence, stated that humans had no way of measuring animal intelligence except in comparison to humans. In order to illustrate her argument, she cited an example of a gorilla being taught and having the capacity to learn to communicate with humans. Rachel further demonstrated her belief in the commonality between humans and animals when she stated in her closing comment, "Animals are just like humans, they need to live a life, we both need shelter and food. It's just like having another form of humans on earth."

Only two students, Kevin and John, explicitly related some understanding of a systems view. In response to a question posed to him about the possibility of there being no medication available to treat people if it could not be tested on animals, Kevin said:

> There's too much of us already and there are animals going extinct so there's less of them. I think we've already hurt them enough and they never hurt us for example...it's like we're their superiors or something like that.

Ryan then entered the conversation.

Ryan: Like we're in control?
Kevin: Yah, but I think us and the animals should be treated equally and not us being the kings.
Ryan: Anyways, every day at least a few people get a disease. If there's no cure, you'd just have to die. What would you decide if [that happens to you] and you need medicine Kevin?
Kevin: Well, nearly a child is being born every minute.
Ryan: [Nodding] Right now.
Kevin: And mostly animals, most of them are dying right now so it's like we grow and they shrink their population because most people like eating animals.
Ryan: But we don't really take them from the wild.

Kevin: I know, I know [still] animals are being eaten right now which decreases the population...

In that exchange, Kevin appeared to be questioning the assumption that a hierarchy existed between animals and humans. John also alluded to what might be referred to as a web of life argument when he commented on an earlier claim that Ryan had made about lions and humans being meat eaters and thereby occupying the top of the food chain:

> You go, lions could eat us, but lions have a short life and then they [become part of the ground] and turn into grass and other animals eat the grass and it keeps on going on like this. It's like no one is at the top of the food chain.

Evidence for Values/Perspective Orientation

The evidence that these students had an understanding of the importance and a respect for other students' perspectives was ample. From my observations, and as evident in the video, the comments and phrases expressed were mutually encouraging. Students demonstrated a high comfort level with each other despite the fact that the opinions being stated could be potentially judged negatively. The next exchange on the issue of fur coats illustrated this point nicely:

Ryan: Carol said something about fur coats, well how would you feel if you went outside, it was snowing, you had no clothes, no fur coat, you freeze and you die.

Caroline: What about using other types of clothing like wool that we don't actually kill the sheep for. Like we shave them almost like shaving a beard. It doesn't hurt them but we still use them to make really nice sweaters to keep warm. We don't need fur. Or you could buy those really thick snow outfits.

Kevin: Yah that's mostly a better solution than killing the animal.

Ryan: But if we stop selling furs, some women would complain because they [need] to buy them to look good.

Kevin: Why can't they make artificial ones?

Caroline: They've already started doing this. Some fur is fake like the stuff that you see on the hoods of winter coats. That stuff is fake.

Another example that showed the open and honest exchange of opinions was again related to the use of animals for fur.

Steve: Caroline said that furs are not useful.

Caroline: No, I said that they're not a necessary item.

Steve: But some people's hobbies are to design houses and to use furs. We don't have to kill them just for coats. What about when they die because they're old, we could just cut up their fur.

Kevin: Well, we aren't cut up when we die.

Caroline: But you don't see many animals dying on the side of the road and [besides] they're not lying on the road dead just for your use. You go into fur coat shops and they can't just have one hanging there.

Steve: I'm not saying that you have to make coats. What about just designing a house?
Caroline: But you don't have to have fur carpets. Can't you just buy normal carpets? There are really nice designs and colours. People who can afford furs can also get people to design really nice things.
Kevin: Some people don't want a dead animal in the house.
Steve: I know but if an animal dies you at least have to use it for something.
Kevin: But we're not used for something. We're not made into big carpets.
Steve: But we don't have anything on our bodies like fur.
Caroline: Can't they just let it go?
Kevin: Can't we just bury them and say a prayer?

It is difficult to determine the tone of a conversation from a transcription. Based on the seriousness of the topic and the phrases spoken, one might expect that this to be a heated debate. However, the tone was not antagonistic nor was it competitive. The students listened carefully to each others' ideas and while maintaining a critical stance, invited dialogue and inclusion in their delivery.

An examination of both societal and personal values also surfaced in their discussions. Basic assumptions were challenged such as the intention and purpose of zoos, the necessity of furs, the distinctions between animals and humans and the rights of animals. The students heard alternate perspectives and used the opportunity to clarify their own understanding.

Evidence for Democratic Principles and Processes Orientation

Moving the evaluation from the video to their written responses, all students showed an appreciation for the format of the activity and could easily recognize its learning value. A respect for diverse opinions and the notion that people learn by listening to different perspectives - two fundamental concepts within democratic thinking - were quite apparent in their answers. The following represent several of their responses to the question: *Do you think holding a discussion is a good way to learn?*

Caroline: Yes because they show everyone's point of view so while you are thinking about something, it might change by listening to someone else's. Also it was very fun because while I was learning, it was fun.
Ryan: Totally yes. We enjoy looking and talking to each other and being on video is cool.
John: Yes. We could all share ideas and it was a fun way to learn. Also, we could express our feelings.
Rachel: Yes, because we learned things about what others thought. It was a great thing to do. It was better than anything.
Young Eun: Yes. I think holding a discussion is a good way to learn and discuss our ideas. I hope we do it again because it was fun and it was especially fun because there was a video camera.
Justin: Yes, because it will help everyone learn faster if everybody agrees to the same idea.

Two additional characteristics considered in this category of humane goals--an inclination towards action and towards change advocacy--surfaced in a few of their responses. The following represent their thoughts on the question: *As a result of our focus on animals, what do you think you will do differently in the future?*

Ryan: I will try to have more discussions like this about animals and talk to the government about [the problems].

John: Now I know more reasons why animals are threatened and how we could prevent this.

Caroline: I will try to persuade people not to buy mink coats or anything like that.

Discussion

Ryan approached me after the session and suggested that we "do a commercial" to help get the word out about the mistreatment and exploitation of animals. At that point I took the opportunity to probe him about whether he had ever addressed human and animal relationships in his regular school curriculum. His response was, "not really. But we did talk about different kinds of animals and how they behave, for instance if they are nocturnal or hibernate. We also talked about the kinds of things that some animals eat and how they reproduce and take care of their babies." Shortly after his remarks, I reflected on my own experiences in elementary education and recalled learning this type of declarative or content knowledge - studying *about* categories of animals and their behaviour. Lessons were rarely if ever framed within an ecological context, animals were portrayed as objects to be studied and little or no critical thinking was required to learn the information. Courtney Hall (1996) writes, "a program lacking in helping students to grow as critical thinkers risks failing in helping students learn how to evaluate the values and practices they embrace and [those that are] embraced by society" (p. 145). I was dismayed at how little elementary education had changed in the last twenty years. It's a small wonder why generations of ecologically illiterate citizens continue to be produced by our educational system (Orr, 1992).

There is a great need, not just in environmental education but in education as a whole, to employ curriculum and strategies that allow for an open and honest critique of human actions and their impacts on the non-human members of our society - in short, to adopt a deep ecological world view. Based on the results of this study, the children's preexisting conceptions about human relationships with animals seem to be fairly sophisticated. There was certainly an overwhelming feeling in their discussions and comments even after the videotaping that students felt these issues were important ones to be studied. Frankly, I was very surprised at the initial level of humane consciousness the displayed by the students. The strong biophilic ethic already present in all of the students, their willingness to discuss societal values and their predisposition to democratic processes indicates that there is, at least with this group, a rich foundation from which to progress.

Upon closer analysis, however, we see that there is room for growth in all four humane categories and a need for extensive exploration in some. Although a biophilic ethic existed in all of the students in terms of the caring and compassion aspect, it was not manifested universally in terms of their understanding of an animal's intrinsic value. For example, when

Steve stated that putting animals in zoos was just like putting them in prison, and later made the claim that an animal should be used for something when it dies, an inconsistency emerged within the biophilic framework and more importantly in his thinking. Similarly, when Caroline pointed out that zoos collected money from the public, Kevin seemed to have difficulty believing that zoos could exist for reasons other than for strictly altruistic purposes. Furthermore, Ryan made the point, in a segment of discussion not included in the results, that animals should be given the right to live out their natural lives, and then another time talked about the necessity of furs. It is imperative that these contradictions and/or naive conceptions are examined in more detail in order that the students attain a consistent biocentric understanding.

Under the category of interconnectedness, a very small number of students demonstrated a systems consciousness. Many of them articulated that humans have had a negative affect on animals but did not consider how their actions could ultimately rebound and negatively affect humans. Kevin did mention several times that with continued mistreatment, endangered species would go extinct and the next generation of children would only be able to see these animals in encyclopedias. However, a more profound understanding of sustainability, biodiversity, and the web of relationships that exist between all phenomena, was not apparent in any of the discussions and would consequently need to be fostered in further classroom activities.

The examination of societal and personal values seemed to emerge naturally. This comes as no surprise as all opinions and perspectives are value-laden and any kind of open dialogue will necessarily result in a discussion and clarification of values. All education has an intrinsic moral component and educators have the responsibility to ensure that society-conscious, ethically-sound values are being fostered. That being said, while the students in this study tackled some important issues, many others, e.g., challenging current patterns of food consumption (Selby, 1994a), the potential and real costs of consumerism, the appropriateness of certain technologies, and who or what will benefit from the technologies, must be addressed in the curriculum in order to educate for critical decision making and values modification.

Additionally, in the category of values/perspectives, it is important that students understand the factors which shape perspectives such as gender, ethnicity, ideology, location and culture (Selby, 1996). John pointed out in his closing statement on the video, "We've been talking about how people kill animals just for their fur but some Native people kill them and use every single part, [they] say a prayer for their souls and eat their flesh. The bones they would make into weapons, so there won't be any waste". Young Eun also expressed an understanding of certain Native traditions with respect to the use of animals. Such perspectives must be explored by *all* students not only to identify alternative strategies and solutions but also to ensure that naive conceptions of culturally-based practices do not lead to forms of prejudice and/or discrimination.

As stated earlier, students articulated an awareness of the value of hearing multiple points of view, which indicated a disposition towards understanding democratic principles and processes. The importance of allowing each person to speak, and the importance of being

heard was also evident in the video. Some students would gesture to others, signaling for them to be quiet to allow the next person to speak, and some would interject with 'I've wanted to say this for a while' or 'can I say something?' when they felt it difficult to enter into the conversation due to the discourse dynamics. Moreover, phrases often spoken, such as 'that's mostly a good point', 'that's a better solution', 'that's very true' and 'actually, she's right', could be attributed to a respect for and consideration of diverse ideas. These are unequivocally praiseworthy characteristics and are fundamental in the democratic classroom. Once this is in place, however, there needs to be a move towards developing a consciousness for planetary citizenship that encompasses a broader definition of democracy that would include alternative points of view expressed by people in other countries.

After the session was over, the atmosphere in the classroom was one of excitement and euphoria. I sensed that, had they been given the chance and had they known about ways to bring about action, they would have been motivated to do so. Future directions in this aspect of humane education would be an incorporation of both local and global strategies for appropriate change agency and acquiring the skills for effective communication and dissemination of knowledge in the community. Further, there is a need for some political education—knowing how and where to engage in action.

It is obvious that further conceptions must be addressed to achieve the goals of humane education. It is equally as important to consider the method in which this is to be done. I believe the instructional strategy employed in this study was an appropriate one for investigating the research questions selected. However, fostering a deep awareness of the humane and environmental issues previously elaborated on will require the use of alternate and perhaps more sophisticated teaching strategies. Several environmental researchers who write from a biocentric perspective identify some possibilities. For example, Russell (1997) states that teaching for change:

> ...involves teaching for the environment through encouragement of environmentally responsible behaviour or activism as well as teaching *with* the environment where deep personal connections are fostered... teaching *with* the environment involves, at least occasionally, getting outside... Getting outside does not negate the importance of schools, however, especially in their fundamental role of human socialization. Rather, it means that we reconsider the possibility of schooling to include the greater community, both human and non-human. (p.38)

Similarly, Selby (1996) offers a strategy which he calls *agitating the comfortable* and, conversely, *comforting the agitated.* This is based on maintaining a balance between comfort and challenge via non-transmissive modes of delivery through an iterative cycle of self-esteem building, group bonding and raising the standard of awareness to more challenging levels. He writes:

> It is, without question, the case that a lecture by a teacher can provide the requisite agitation and should be a learning strategy sparingly and judiciously employed amidst a range of other approaches. The challenge to prevailing values, perspectives and paradigms is however, most effectively and economically achieved on a regular basis through forms of interactive and experiential learning. (p.53)

An exploration of these and other instructional strategies will be vital in bringing about the shift to a deep ecological world view.

Future Directions

This study reports on only three sessions and takes a preliminary but substantial look at students' conceptions of human-animal relationships. It does not look at the equitable distribution of student collaboration, the influence of peer attitudes on decision making or make any suggestions regarding activities to be employed in further learning. There are many more insights to be revealed. Future directions for research in this area may include, identifying strategies that best support change agency and on a more philosophical level, understanding how human values might change through experiencing alternate forms of knowing.

It has been established here that by at least grade 5, children have fairly robust conceptions and strong opinions about the uses and rights of animals. Along the way in their education, these feelings are not being encouraged or even acknowledged. *In Starting Points: Questions of Quality in Environmental Education*, Hart et al (1999) suggest that a description of "good education" is something that must be addressed by all educators. They present the following list of questions as starting points for teachers to reflect on when programming for environmental classes:

Does environmental education lead students to...

- think critically and creatively and reason carefully?
- explore how attitudes are shaped through physical, social, and political contexts?
- inquire systematically into an important matter (to the student), a real-world problem, or a real issue?
- analyze, synthesize, and evaluate information and arguments?
- weigh and evaluate their own values and the perspectives of others?
- make independent decisions?
- communicate effectively to a variety of audiences in a variety of forms?
- co-operate with, and respect other, regardless of differences?

Many, if not all of these questions, have been initially explored in this study. It seeks to add to the growing literature base on establishing curricular content and strategies to be used to formulate a consistent and common understanding amongst environmental educators and their students. The time for education to make a shift towards a biocentric world view is now. Otherwise, with an overall ambivalent attitude towards the most important science and technology issues facing society today, we will continue on this path of ecological crisis. The challenge for teachers is to begin the dialogue in their classrooms.

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